IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of:		
Wei Li, et al.	)	Confirmation No.: 4451
Serial No.: 10/643,628	)	Examiner: Usmaan Saeed
Filed on: August 18, 2003	)	Group Art Unit No.: 2166

For: EXPRESSING FREQUENT ITEMSET COUNTING OPERATIONS

Via EFS-Web
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

REPLY BRIEF UNDER 37 CFR § 41.41

Sir:

This is in response to the Examiner's Answer mailed April 27, 2009. The period for reply runs until June 27, 2009.

REMARKS

1. In the Examiner's Answer, although the Examiner generally **identifies** that arguments were made in the Appeal Brief regarding Claims 1, 9-11, and 29, the Examiner fails to specifically **address** those arguments. Thus, those arguments appear to be uncontested. In addition, in at least one instance, the Examiner has cited a new portion of a reference. Although the arguments in the Appeal Brief are still applicable, responses to some of the Examiner's rejections are made herein.

2. Claim 1 recites a database statement that references a function that:

- **counts and returns frequent itemsets;**
- **has a cursor as an input parameter;**
- **uses the cursor to access values from rows that are returned from a SELECT statement; and**
- **identifies said frequent itemsets based on said values from said rows returned by said SELECT statement.**

With respect to this function recited in Claim 1, the Examiner's analysis of what in *Agrawal* could be equated to the recited function has evolved over time. In previous Office Actions and in the "Grounds of Rejection" section of the Answer, the Examiner has maintained that the group-by query referenced in col. 2, lines 53-56 of *Agrawal* is the same as the recited function. However, on pages 6-7 of the Appeal Brief, Applicants' have provided arguments as to why such a correlation cannot be made. The Examiner has yet to respond to such arguments.

In the Advisory Action, the Examiner, for the first time, equated the GatherComb-K table function in col. 10 of *Agrawal* to the recited function of Claim 1. On pages 7-8 of the Appeal Brief, Applicants' have provided arguments as to why such a correlation cannot be made. The Examiner maintains this correlation in the "Response to Argument" section of the

Answer. The Examiner's Answer copies col. 10, lines 13-56 of *Agrawal* and provides the following three assertions:

> [1] Examiner respectfully submits that the above lines and figure 11 show that the GatherComb-K function is being used for counting and returning all k item combinations for a transaction and this table function gets only frequent items with 2-item combinations for k=2 per transaction. [2] Agrawal's Col 15, further teaches that the table function maintains a counter. [3] Agrawal further teaches on col 11, lines 5-12, that the function updates the counters and outputs only the frequent itemsets after the last transaction.
> Therefore, examiner interprets Agrawal's function containing a counter for counting and returning frequent itemsets after the last transaction as the function claimed by the applicant.

With respect to the first assertion, it is conceded that the GatherComb-K function is being used for counting. However, it is clear from *Agrawal* and the Appeal Brief that GatherComb-K does not, on its own, count and return frequent itemsets. From the example database statement (in pseudo-code) in col. 10, lines 41-50 of *Agrawal*, it is clear that GatherComb-K is insufficient, by itself, to count and return frequent itemsets. That example database statement shows that Gather and Comb-K are merely parts of the database statement, the **entirety** of which **must be used** to count and return frequent itemsets. Thus, the GatherComb-K table function does not **count** and **return** frequent itemsets.

With respect to the second assertion, col. 15 of *Agrawal* is cited for the first time for disclosing the function recited in Claim 1. It is respectfully noted that the table function in referenced in col. 15 of *Agrawal* is completely unrelated to the GatherComb-K table function. Instead, the table function in col. 15 is used to reduce the length of transaction identifiers (tids) so that group-by and tid-list operations may be performed more efficiently. Specifically, the table function in col. 15:

> is used to map the tids [(transaction identifiers)] to unique integers.... The input to the table function is the data table in the tid order. The table function remembers the previous tid and...maintains a counter. Every time the tid changes, the counter is incremented. This counter value is the mapping assigned to each tid.

Therefore, this table function in col. 15 has **nothing** to do with the counting or returning of frequent itemsets.

With respect to the third assertion, col. 11 of *Agrawal* is cited for the first time for disclosing the function recited in Claim 1. Col. 11, lines 1-3 of *Agrawal* teaches that GatherCount is an **approach** that is a variation of the **second pass** of the GatherJoin **approach**. The pseudo code of the second pass of the GatherJoin approach is located at col. 10, lines 62-66 of *Agrawal*. Again, any table functions listed in the pseudo code is part of the database statement, the **entirety** of which **must be used** to count and return frequent itemsets.

3. The Examiner's Answer asserts that "**Chen** teaches **'a cursor as input.'**" (emphasis in original). However, none of the cited portions of *Chen* teach or suggest that the cursor is even input to a function, as Claim 1 requires.

Further, the Examiner's Answer asserts, "The combination of Chen's cursor used for accessing values from the rows combined with the Agrawal's function used to count and generate frequent itemsets teaches the argued limitation as a whole." Even if each individual reference did disclose the respective features of Claim 1, it does **not** follow that the combination would teach the argued limitation as a whole. As outlined in the Appeal Brief, one of ordinary skill in the art would not and could not combine *Chen* with *Agrawal*. Indeed, none of *Agrawal*'s table functions are configured to even accept a cursor as input. Therefore, there is

no reason to use *Chen*'s invention, which involves locking a row, when utilizing a cursor, in order to achieve high concurrency for the row.

4. The Examiner's Answer fails to address the arguments provided in the Appeal Brief (on pages 8-9) regarding why the combination of *Agrawal* and *Chen* is improper. For purposes of brevity, those arguments are not repeated herein.

5. The Examiner's Answer further asserts that paragraph 32 of *Chen* teaches "wherein the cursor is used **by the function** to access values from rows that are returned from a SELECT statement" as recited in Claim 1. This is incorrect. Paragraph 32 lacks any teaching or suggestion of **any** function, much less a function similar to the function recited in Claim 1 that uses a cursor.

6. The Examiner's Answer also asserts that col. 2, lines 52-56 of *Agrawal* teaches "wherein the function identifies said frequent itemsets based on said values from said rows returned by said SELECT statement," as recited in Claim 1. Even if a function in *Agrawal* (e.g., GatherComb-K) did identify frequent itemsets, those frequent itemsets are **not** based on values from rows returned by a SELECT statement, as Claim 1 would require. Indeed, the only SELECT statements in *Agrawal* are SELECT statements that are outside of any table functions.

7. With respect to Claim 9, the Examiner's Answer fails to respond to any of the arguments provided in the Appeal Brief (on pages 9-10). Instead, the Examiner's Answer cites the same portions of *Agrawal* and *Bayardo* and adds, referring to col. 12, lines 49-56, "These lines teach performing frequent itemset operation on combination of items whose support is

greater than a minimum support, which will exclude all the combination of items that are below the minimum support." The arguments provided on pages 9-10 of the Appeal Brief still apply: namely, that the "support [in *Agrawal*] of an item is the number of **transactions** that contain the item" (col. 2, lines 57-58), while the "minimum length" of Claim 9 is referring to the number of **items** in an itemset. For example, the item set {A, B, C} may have minimum support (e.g., 20+ transactions contain each of those items) but may still be less than the minimum length (e.g., four). In other words, "minimum support" is much different than "minimum length."

In fact, according to Claim 9, the minimum length is the "additional criteria" specified in Claim 3 (from which Claim 9 depends) and Claim 3 recites, "said additional criteria do not specify any criterion that relates to how frequently combinations of items appear together." Because *Agrawal*'s "minimum support" relates to how frequently combinations of items appear together, *Agrawal*'s "minimum support" cannot be the recited additional criteria of Claim 9 and, therefore, cannot be the recited minimum length.

8. With respect to Claim 10, the Examiner's Answer fails to address the specific arguments provided in the Appeal Brief (on pages 10-12). For purposes of brevity, those arguments are not repeated herein.

The Examiner's Answer does add the following language after quoting col. 5, lines 56-60 of *Agrawal*: "These lines teach performing frequent itemset operation on combination of items whose have maximum number of items with size k and length of itemset." However, the only "maximum" number in the cited portions of *Agrawal* (specifically col. 5, lines 56-60) refers to the maximum number of columns that a database supports. Further, the only alleged "maximum length" in the cited portion of *Bayardo* (i.e., col. 1, lines 22-26) actually refers to

the fact that "frequent-pattern mining methods have been developed to operate on databases in which the longest frequent patterns are relatively short, e.g., those with less than 10 items." It does **not** follow that these teachings of *Agrawal* and *Bayardo* (even if combinable) could teach or suggest Claim 10's limitation that a maximum length is **specified** in the database statement and that performing of the frequent itemset operation results in **excluding** all item sets that include more items than the specified maximum length.

9. With respect to Claim 11, the Examiner's Answer fails to address the specific arguments provided in the Appeal Brief (on pages 12-13) regarding Claim 11. For purposes of brevity, those arguments are not repeated.

It is interesting to note that the "Grounds of Rejection" section of the Examiner's Answer repeats the rejection of Claim 11 given in the Final Office Action. In that section, the Examiner states that *Agrawal* does **not** teach the "one or more included items" recited in Claim 11. However, in the "Response to Arguments" section of the Examiner's Answer, the Examiner asserts that *Agrawal* **does teach** the recited "one or more included items" of Claim 11. Specifically, the Examiner's Answer equates the confidence criteria in col. 3, lines 2-16 of *Agrawal* with the recited "one or more included items." This is incorrect for multiple reasons. First, *Agrawal*'s confidence criteria are not specified in a database statement as Claim 11 would require. Second, *Agrawal*'s confidence criteria are regarding candidate **rules**, not itemsets.

10. With respect to Claim 29, the Examiner's Answer fails to address the specific arguments provided in the Appeal Brief (on pages 13-14) regarding Claim 29. For purposes of brevity, those arguments are not repeated.

CONCLUSION

Based on the foregoing, it is respectfully submitted that the rejection of Claims 1-7, 9-20, and 22-30 under 35 U.S.C. § 103(a) as allegedly being unpatentable over the cited art lacks the requisite factual and legal bases. Appellants therefore respectfully request that the Honorable Board reverse the rejection of Claims 1-7, 9-20, and 22-30 under 35 U.S.C. § 103(a).

Respectfully submitted,

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